

HotNews

from the heat transfer society



December, 1998

Issue 98/2

The President's Night

For his Presidential Address, David Bate of ICI gave us a highly entertaining presentation on what really happens to process heat exchangers after we, the heat transfer experts, think our job is over. The meeting this year was in the prestigious surroundings of the Royal Academy of Engineering on 20 October.

Exchangers might be well specified for the duty and sensibly designed but then the unexpected occurs. He gave the example of start-up when the operators fired only those burners remote from the thermocouples to avoid overheating of tubes being "indicated". The alarms didn't go off but the heater was destroyed by burning out those tubes remote from the thermocouples but close to the fired burners.

No talk of this type is complete without stories of fouling. David did not let us down. He showed a TEMA X-shell where the perforated plate distributor was blocked due to fouling. Cutting bigger slots in the plate solved that problem but, by removing an excellent filter, opened the way to fouling the tubes themselves.

Problem exchangers were usually found to be in a very sorry state when opened up for inspection. The surprise was not that they were working badly but that they worked at all, which led David to conclude that exchanger were extremely robust devices.

Lack of information always presents a problem to the heat transfer engineer. Instrumentation is the first thing to go in cost reduction exercises and instruments are rarely included to monitor non-standard operation. For example, when decoking furnace tubes, the temperatures can get very high and the flow may be backwards. Operators are usually flying blind or trying to infer flow rates from pressure drops. In one case, a high pressure-drop was

due to high fouling not high flow, the result being serious degrading of the furnace tubes due to severe overheating.

David's conclusions were that the interface between the designer and the plant operator needs to be improved, we need to think more about where to make measurements on plant and we have to guard against operator bad practice. One danger is that mistaken concepts can be passed on from one generation of operators to the next.

Last call for papers

The 6th UK National Conference on Heat Transfer, which is supported by the *hts*, will be held at the Heriot Watt University on 15-16 September, 1999. **Synopses of proposed papers are requested by 8 January** although there is some leeway for later replies. For more details, contact Stephanie Love at the IMechE.

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Venue for London Meetings

For many years, we have been using the upstairs room at the Barley Mow on Horseferry Road for London Meetings such as the AGM and Forums. This venue will no longer be available after the AGM in March. The hunt is therefore on for an alternative. We need a room that will take up to 40 people in theater style with catering and, preferably, a bar. If anyone knows such a place in central London, please let a committee member know.

This Issue

- Special general meeting
- Questionnaire replies
- *hts* web site
- Membership fees
- Forum evenings
- Waste heat!

Special general meeting

Following the Forum meeting on 19 November, we held a Special General Meeting to vote on proposed changes to the Rules and Constitution of the Society. Don't panic! We have not converted the society into a different sort of organisation without you having noticed.

The reason for the amendment is that changes in the rules covering Friendly Societies, of which *hts* is one, have forced us to modify our constitution to match. In particular, we needed to make a quick-fix change to continue with our current, cost-effective procedure on auditing our accounts.

The changes were approved by the Meeting. Further details may be obtained from Simon Earland (Fax: 01245 349 161) for those interested in the minutia of legal documents.

These quick-fix changes got us over the immediate problem, but a more-thorough revision is necessary to bring the constitution more into line with the way we actually now operate and to conform better with the various laws governing Friendly Societies. We will therefore be tabling further amendments at future meetings.

Questionnaire results

We sent out a questionnaire with the last *HotNews* to find out what you, the *hts* Members want from the Society. Disappointingly, we only received 26 replies from the 400 plus members. This contrasts sharply with a recent similar questionnaire sent out to Fellows of the Royal Academy of Engineering which resulted in a 60 per cent response. The *hts* Committee hopes that the low response means that the rest of you are content with what we are doing.

The replies we did receive tended to support what the Committee is doing now or is planning for the future.

The questionnaire comprised a number of propositions about which you could indicate your level of agreement or disagreement. The propositions which received strongest support were

- *hts* is for me to make contacts of value to my career
- London forums are an essential *hts* activity

- The annual dinner is an essential *hts* event
- The *hts* newsletter is an essential document, and
- *hts* should hold more forums outside London

The three propositions that received the least support were

- The *hts* newsletter should be livened up by, say, being in colour and including pictures
- I like having and wearing the *hts* tie (scarf for ladies), and
- I am keen to help in organising *hts* events.

One proposition which received surprising, although not overwhelming, support was, *I would be willing to pay a higher membership fee so that hts could provide more activities and services*. While 30 per cent had no view, 58 per cent supported the proposition and only 12 per cent disagreed. You will be pleased to know, however, that this does not mean that the fees are about to shoot up.

We also received valuable comments, one of which was "*...you are reaching the parts that HTFS, HTRI and the Institutions [don't reach].*"

Thanks once more to those who did respond. If you didn't respond, any comments you may have will be gratefully received at any time by any Committee Member.

www.hts.org.uk

This *HotNews* is our traditional way of keeping you in touch with *hts*. Our new way is the web site which is now in full swing. Check it out! Reports on forums and other events appear there long before you get the newsletter. Look up future events when you just can't remember where you left that meeting notice!

We are also keen to hear any ideas you may have for improving the site.

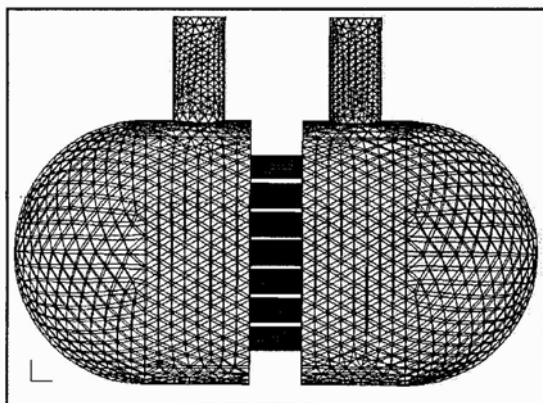
Bargain Membership rates

hts membership fees, at £7, must be the lowest of any similar organisation. Nevertheless, a few Members have never got round to amending their standing orders from when the fees were even lower. If you are one of these, and fail to pay the full amount for 1999, we are pleased to receive your payment **as a donation to the society** but can no longer accept it as a Membership fee.

Forum Evenings

A model career?

At the September Forum, Peter Ellerby of Cal Gavin gave his answer to the question of whether computational fluid dynamics (CFD) is now a tool for the practising heat transfer engineer. His view was that CFD was emerging from the stage of experts-only software but is still not for the faint hearted.



Grid used in modelling flow in shell-and-tube

On the plus side, we now have semi-automatic grid generation, models that relate to heat exchangers, and the software can be used on the PC. Against this, users do need to be trained in the software and to gain experience in selecting the right turbulence models, setting up the boundary conditions and refining the grids.

Peter emphasised the importance of deciding your solution strategy from the start rather than trying to sort it out one step at a time.

CFD is particularly good at investigating flow distribution problems in heat exchangers, especially when new configurations are being tried. This was illustrated by showing calculations on the tube-side flow distribution arising from different nozzle arrangements in a single-pass, shell-and-tube exchanger.

Part of the discussion centred on how you know that you are getting a sensible answer. This seems to be down to engineering judgement of whether the answer is reasonable. Peter felt that it was still best to have some experimental validation, if possible.

In from the cold!

At the November Forum, Richard Clarke of BOC Process Plants gave an informative talk on plate-fin heat exchangers (PFHEs). Typically, these are about a fifth the size of the equivalent shell and tube. They come into their own with very demanding duties involving low temperature differences (down to 0.3 K) and high thermal effectiveness (up to 99%).

The history of successful cryogenic plant, like air-separation plant, is intimately linked with the development of the brazed aluminium PFHE. Their large heat duty in a small volume minimises heat leak into the exchanger which would otherwise render the process uneconomic. Their multi-stream capability lends itself well to process integration (pinch technology) which had been used routinely in the cryogenic industries before being rediscovered by the oil and chemical industries.

Richard described the structure of PFHEs explaining the use of distributors, multi-stream configuration, finning types and manufacturing integrity.

Richard felt strongly that the greater use of these units in non-cryogenic applications was dependent on exploiting their special features to improve the process rather than simply replacing a two-stream shell and tube with a two-stream plate fin. To this end, good links between process simulator software and plate fin software were essential.

The problem of fouling was raised in the question and answer session. While recognising the dangers of fouling blocking channels, Richard emphasised that the flow distribution is very uniform so the wall temperatures everywhere is known. Hence hot spots, which might promote fouling, may be avoided.



Richard Clarke at the November Forum

Waste Heat

by L M Teedy

A hot bath

As I fill my bath, the water rises towards the rim. What should I do? I know, I will hold a cup under the tap. It works. The bath is no longer filling. But what happens when the cup is full?

Madness? Yes, but I come across otherwise intelligent people who advocate just that solution to global warming. Rather than turn the tap off in the form of reducing the combustion of fossil fuels, they argue that we should grow more trees. So, what happens when the trees have grown and die? Do we store them indefinitely preventing them from rotting down to release CO₂, or worse, methane?

The most bizarre manifestation of the cup-under-tap theory came recently from scientists at the prestigious Yale University. They argued that, because America grows so many trees, it is a net reducer of global warming rather than the world's worst contributor to it. Nice try! But what can you expect from a country that calls a *tap* a *faucet*?

Global Warming

Of course, we could use the trees as fuel thereby substituting for fossil fuel and thus turning the tap down a little. But this is never part of the argument of the tree advocates. Having said this, I am pleased to see that a power station has just opened in Yorkshire which does indeed use trees, some specially grown, to generate power. Well, it is only a 10MW station, but it is a start. (My newspaper said it generated 10MW **per day!!!!**)

Global Fouling

So much for Global Warming, rumour has it that HTRI are setting up what they call a global fouling initiative. Do they intend to reduce Global Fouling or increase it?

Global Clamping

One *hts* member, Dave Butterworth left his car at a parking meter by the Barley Mow to attend the September Forum. Despite having paid the correct amount for parking he returned to find a ticket for a £30 fine on the front window and a red sign saying, "Authorised for clamping" on

the side window. The reason given for the fine was, "Parking at an out of order meter," and, sure enough, the parking attendant had kindly stuck a bag over the meter to say, "Out of order".

Dave then started a long battle with Westminster Council over this parking ticket. Eventually, three months later to the day, he received a three-page letter of apology and explanation from the Council with a promise to return the £30 fine. Dave can't help thinking that the sudden turnaround on the part of the Council had something to do with the half-page article about his battle which had appeared in the Guardian Newspaper the previous day. But, then, Dave always was a cynic.



*Picture of Dave Butterworth which appeared in the Guardian on 10 November
(courtesy of the Guardian)*

The views of L M Teedy are not necessarily those of the *hts*.

Future Events

- *London Forum, Tuesday, January 12 1999. Closing the gap between process engineers and heat exchanger designers. Graham Polley and other speakers*
- *London Forum, Tuesday 9 February, 1999. Developments in gaskets, speaker from Flexitallic.*
- *Annual General Meeting, London, 4 March 1999*
- *Annual Dinner, London, 26 March, 1999*

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